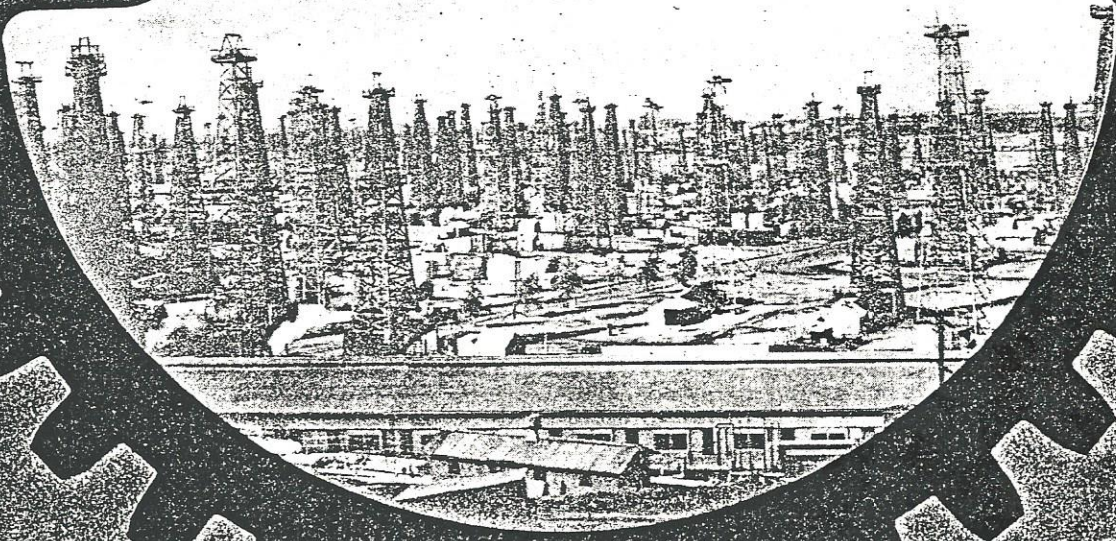
PACIFIC-WESTERN

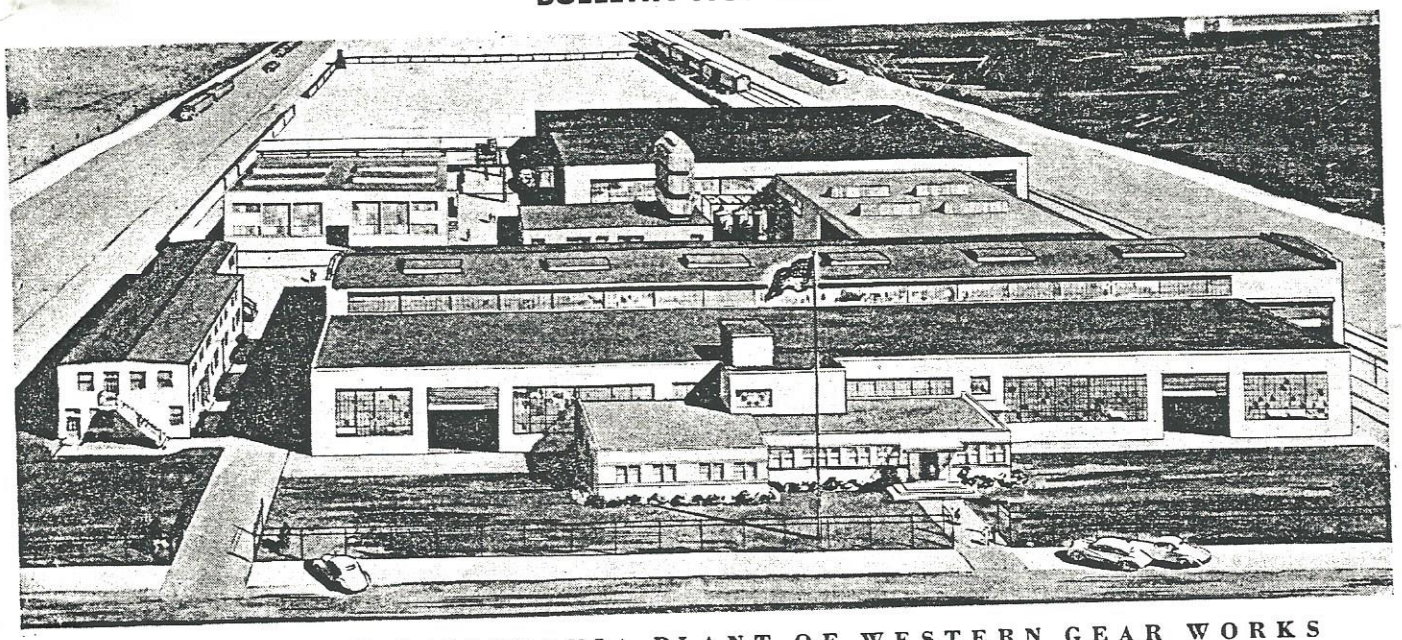


OIL FIELD PUMPING EQUIPMENT

BULLETIN NUMBER 4604

PACIFIC
OIL FIELD PUMPING EQUIPMENT

BULLETIN NO. 4604



THE LYNWOOD CALIFORNIA PLANT OF WESTERN GEAR WORKS

Dependable OIL FIELD Equipment . . . backed by an organization with a 50 year history on the Pacific Coast

Today, Pacific-Western Oil Field equipment is manufactured by Pacific Gear & Tool Works and Western Gear Works in newly expanded plants having hundreds of the latest and finest precision machine tools and equipment; and backed by a reputation of over 50 years of service to Western industries.

History of Pacific-Western goes back prior to 1889, the year that Mr. Philip L. Bannan entered the employ of P. T. Taylor & Company of San Francisco, which company was the successor of the Van Drake Machine Works, San Francisco, established in the 1880's. In 1903, Mr. Bannan and associates changed the name to Pacific Gear & Tool Works. Later, Western Gear Works was established with plants in Seattle, Washington, and Lynwood, California.

Now, these three associate plants are operated by Thomas J. Bannan and his four brothers. Here you will find the highest caliber of engineering talent and equipment for manufacturing all types of gears and geared products.

The first Pacific-Western Herringbone Gear Reducer to be used for oil well pumping was placed in service by the Miley Petroleum Company at Athens, California, in 1927. Today, Pacific-Western manufactures a complete line of oil field pumping equipment incorporating the highest standards of engineering features, quality materials and precision workmanship, all founded upon over 50 years of experience.

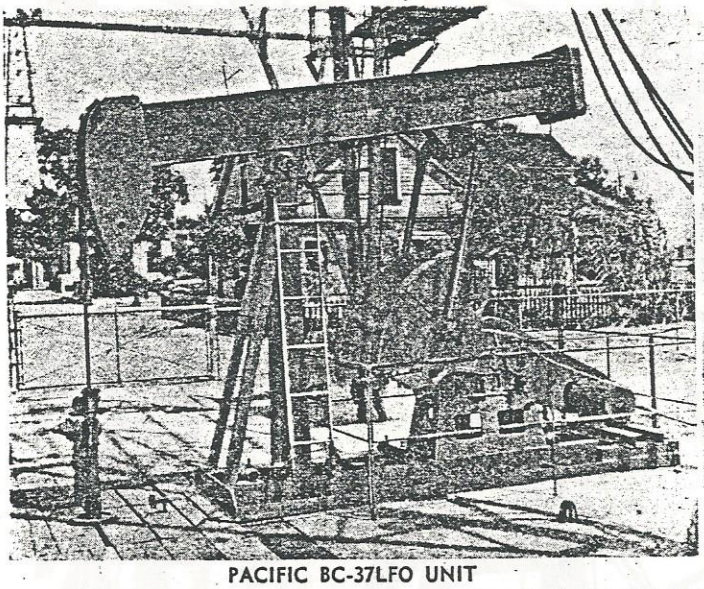
Member American Petroleum Institute

WESTERN GEAR WORKS
417 Ninth Ave. S., Seattle 4, Wash.
2600 Imperial Highway, Lynwood, Calif.

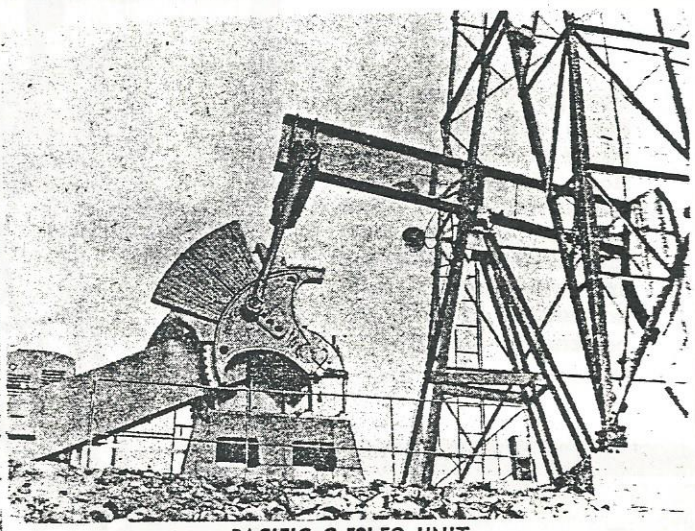
PACIFIC GEAR & TOOL WORKS
1035 Folsom St.
San Francisco, Calif.

PACIFIC-WESTERN GEAR PRODUCTS

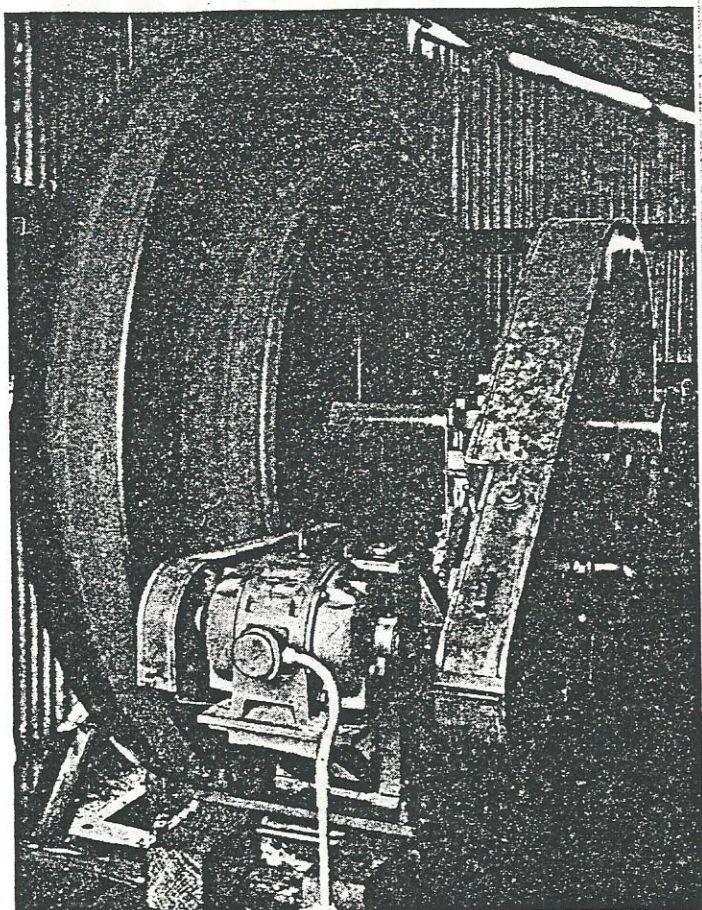
TYPICAL PACIFIC PUMPING UNITS



PACIFIC BC-37LFO UNIT



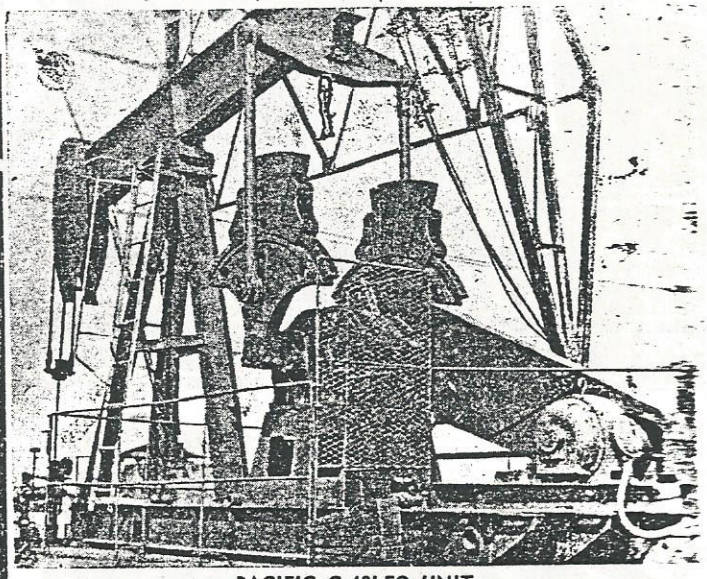
PACIFIC C-52LFO UNIT



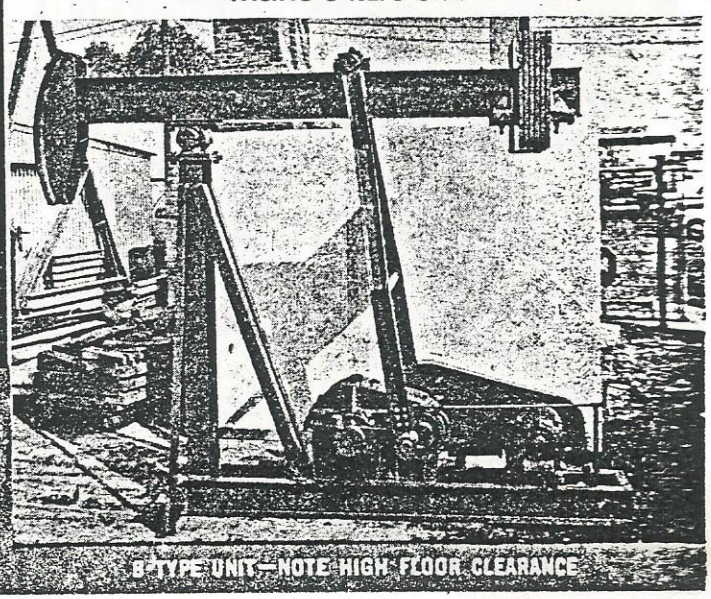
PACIFIC BANDWHEEL DRIVE ON STANDARD END

In the Field With...

PACIFIC PUMPING UNITS



PACIFIC C-48LFO UNIT

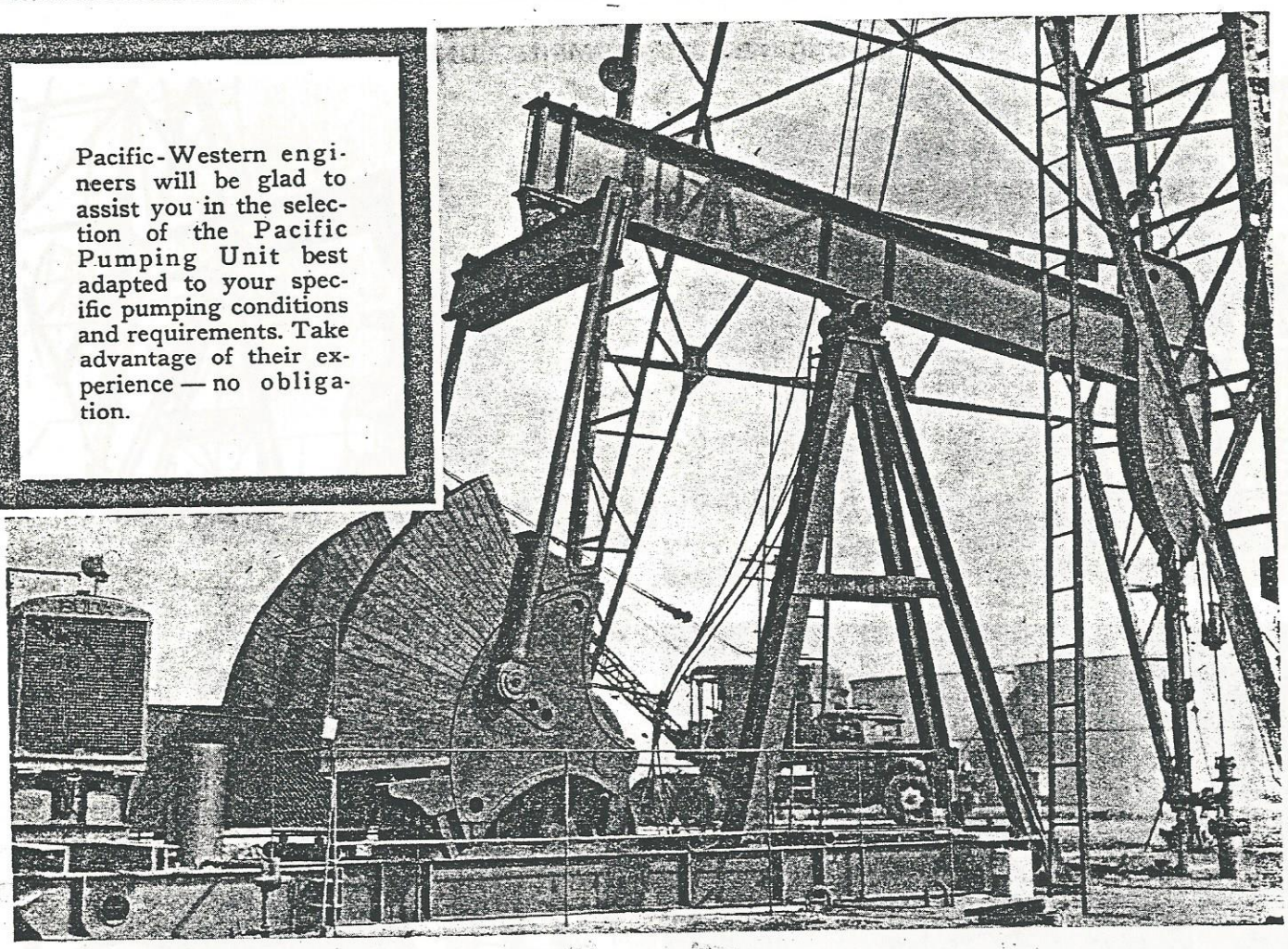


B-TYPE UNIT—NOTE HIGH FLOOR CLEARANCE

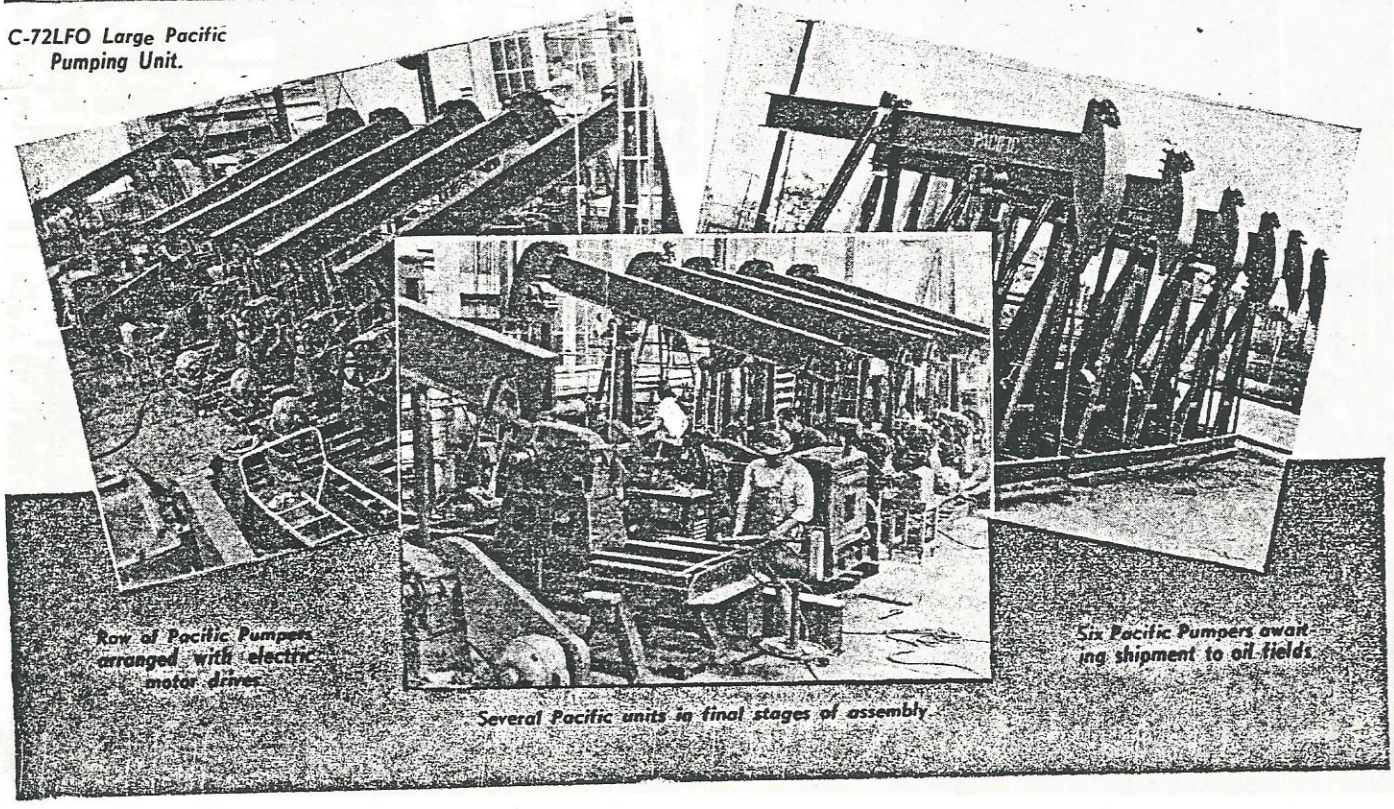
WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

Pacific-Western engineers will be glad to assist you in the selection of the Pacific Pumping Unit best adapted to your specific pumping conditions and requirements. Take advantage of their experience — no obligation.



C-72LFO Large Pacific Pumping Unit.



Row of Pacific Pumpers arranged with electric motor drives

Several Pacific units in final stages of assembly

Six Pacific Pumpers awaiting shipment to oil fields

WESTERN GEAR WORKS LYNWOOD, CALIFORNIA
MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

TYPES AND SPECIFICATIONS—PACIFIC PUMPING UNITS

Pacific Pumping Units are built in three series—B, BC and C

SERIES B

Series B is of the Twin Crank Counterbalance type and employs a Beam Counterbalance. The unit, self-contained and portable, is driven through a Pacific-Western High Ratio Double Reduction Herringbone type Speed Reducer.

Counterbalance is obtained by adding weights to the extended portion of the Walking Beam. Weights, of cast iron wafer type, are secured to the beam by two movable brackets with set screws, simplifying adjustment of the weights on the beam.

Cranks are of the clamp hub type which swing clear of the floor on all but largest size.

SPECIFICATIONS

UNIT	Stroke Length	API Polish Rod Load Capacity	API Peak Torque Rating	Nominal Horsepower at 20 SPM	Gear Ratio	Effective Counter Balance	Gross Weight Less Motor
B-30LFO-6	24–20½–18	6,000 lbs.	28,000 lbs.	5.66	43.4	5,314 lbs.	4,356 lbs.

SERIES BC

Series BC is of the Twin Crank, combination Rotating and Beam Counterbalance type. The unit, self-contained and portable, is driven through a Pacific-Western High Ratio Double Reduction Herringbone type Speed Reducer.

Twin cast iron cranks of the clamp hub type are mounted on the Low Speed Shaft of the Reduction Gear. The cranks are fan shaped and weights are added in small, light increments.

Additional counterbalance is obtained by adding weights to the extended portion of the Walking Beam. Weights of cast iron wafer type are secured to the beam by two movable brackets with set screws. simplifying adjustment of weights on the beam.

SPECIFICATIONS

UNIT	Stroke Lengths	API Polish Rod Load Capacity	API Peak Torque Rating	Nominal Horsepower at 20 SPM	Gear Ratio	Effective Counter Balance	Gross Weight Less Motor
BC-37LFO-12	36–30–24 in.	12,000 lbs.	60,000 in. lbs.	12.15	41.2	9,920 lbs.	13,800 lbs.
BC-33LFO-10	30–24 in.	10,000 lbs.	40,000 in. lbs.	8.1	43.1	9,015 lbs.	11,700 lbs.
BC-30LFO-8	27–21 in.	8,000 lbs.	28,000 in. lbs.	5.66	43.3	7,900 lbs.	10,500 lbs.

SERIES C

Series C is of the Twin Crank Rotating Counterbalance type. The unit, self-contained and portable, is driven through a Pacific-Western High Ratio Double Reduction Herringbone type Speed Reducer.

Counterbalance is accomplished with Twin Pacific Cranks. Crank body is of cast iron and designed with a clamp hub for easy removal. Cranks are fan shaped and weights are added in small, light increments.

SPECIFICATIONS

UNIT	Stroke Lengths	API Polish Rod Load Capacity	API Peak Torque Rating	Nominal Horsepower at 20 SPM	Gear Ratio	Effective Counter Balance	Gross Weight Less Motor
C-72LFO-30	102–88–75–61 in.	30,000 lbs.	452,000 in. lbs.	91.5	47.3	22,400 lbs.	43,608 lbs.
C-60LFO-25	74–62–51–39 in.	25,000 lbs.	260,000 in. lbs.	53.0	48.1	16,060 lbs.	30,964 lbs.
C-52LFO-25	64–54–44–34 in.	25,000 lbs.	177,000 in. lbs.	35.6	33.2	12,719 lbs.	24,852 lbs.
C-48LFO-20	54–44–34 in.	20,000 lbs.	137,000 in. lbs.	28.0	32.1	9,070 lbs.	18,852 lbs.
C-42LFO-15	44–34–24 in.	15,000 lbs.	90,000 in. lbs.	18.2	41.2	7,340 lbs.	3,550 lbs.

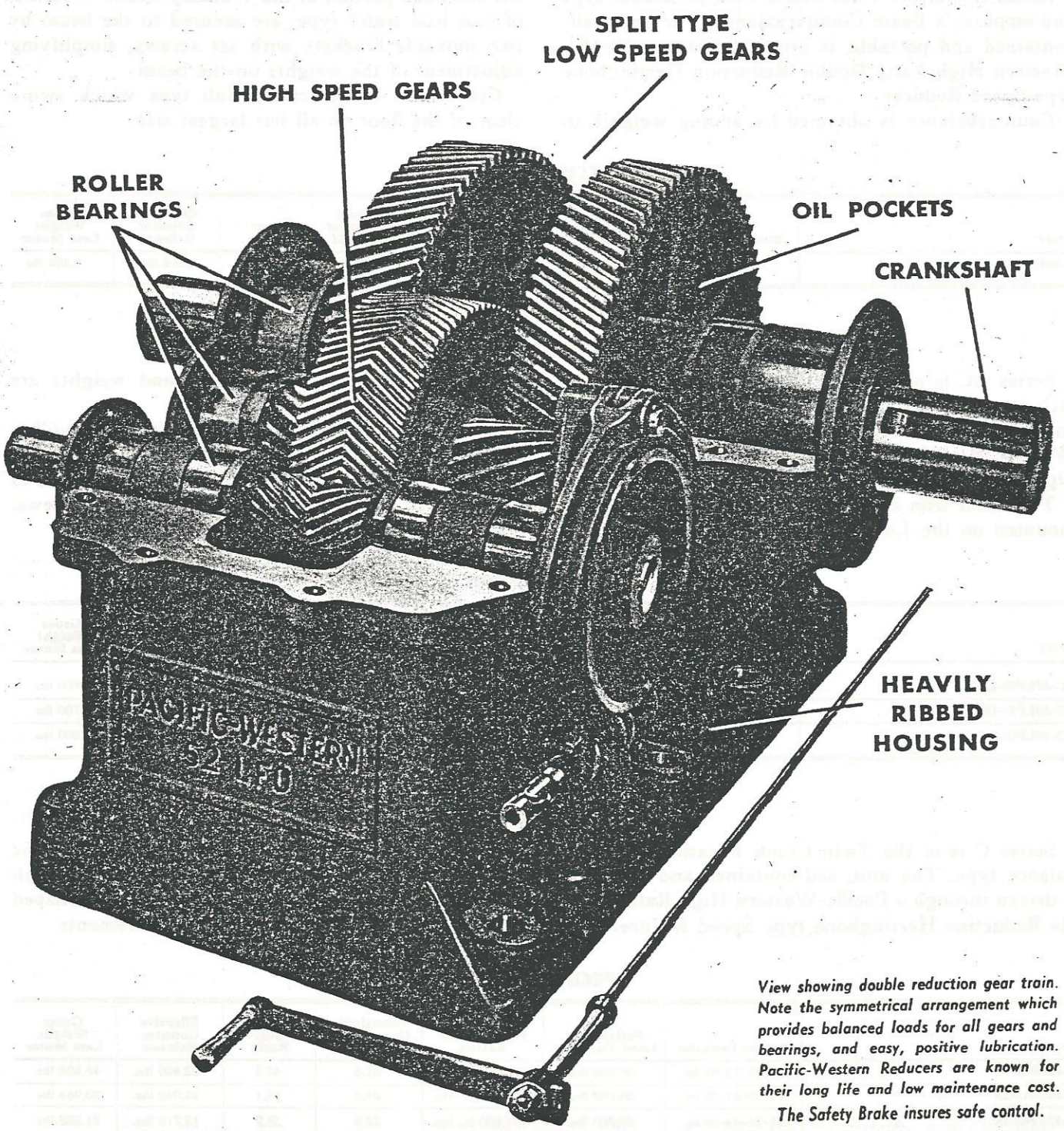
Cranks on all units are floor clearing with the exception of Type C-72LFO-30.

WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

BALANCED DESIGN...

Insures Long Life and Minimum Maintenance.



View showing double reduction gear train. Note the symmetrical arrangement which provides balanced loads for all gears and bearings, and easy, positive lubrication. Pacific-Western Reducers are known for their long life and low maintenance cost.

The Safety Brake insures safe control.

Type LFO Herringbone Speed Reducer for Oil Well Pumping

WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

FEATURES

of Pacific-Western Speed Reducer Design

Balanced design, compact and symmetrical. Gear thrusts and all stresses balanced, requiring no thrust bearings.

Heavy-duty cylindrical type roller bearings throughout. No adjustments necessary.

Shafts of alloy steel, heat treated, machined and ground to precision fits.

Herringbone Gears of special alloy steel, heat treated and hardened. Oil and dust proof housings, with large oil reservoir. No gaskets. Positive continuous lubrication to each bearing. Gears run in oil bath. A distinguishing and important characteristic of Pacific-Western design is that the low speed gears which carry the maximum torque are located directly adjacent to the low speed bearings, insuring minimum shaft deflection and maximum gear life.

SAFETY BRAKE can not be accidentally released.

Illustrated on the opposite page is the heart of the PACIFIC Pumping Unit, the PACIFIC-WESTERN Herringbone Gear Speed Reducer. It is confidently believed this proved gear unit is the best built for this service. Being experienced manufacturers of all types of gearing, including Herringbone, Helical, Spur, Bevel, Hypoid and Worm Gears, as well as Chain Drives, we have selected, without prejudice, the best type and arrangement of gearing to meet the conditions peculiar to oil well pumping. Internally balanced and arranged for minimum unit stresses in all parts, this rugged gear unit is unusually free from mechanical failures. Tests show an overall full load transmission efficiency over 97%. The gear ratios are exceptionally high, the entire line having an average ratio of 42 to 1. Because of this feature, slower pumping speeds can be obtained with lower cost high speed prime movers. The following paragraphs describe the design in detail.

HOUSING: Made of gray iron castings, with liberal and well placed ribs, the housing is designed to maintain accurate alignment of the gears under the racking conditions of oil well pumping. The housing completely encloses the gear train, providing dust-proof and weather-proof protection, and retains the lubricant without leakage. All joints are precision machined, no gaskets are required. All internal surfaces are painted with a special sealing compound to insure cleanliness. External surfaces are treated with a rust-inhibiting primer before the finish coats are applied.

CRANKSHAFT: The main shaft, or Crankshaft, is of carbon alloy steel, large enough in all cases to more than meet the A.P.I. recommended practice for oil well pumping speed reducers.

BEARINGS: The cylindrical type of roller bearings, which permit the shafts to float freely in an axial direction, in combination with the balanced arrangement of the gearing, insures equal distribution of the load on both faces of the herringbone gears. When the shafts are constrained axially thru use of bearings designed to take thrusts as well as radial loads, it is possible to concentrate all of the load on one side of the herringbone gear thru improper adjustment or uneven wear. This would result in seriously overloading one-half of this gear and premature failure. This condition cannot exist in the Pacific-Western unit.

LUBRICATION: Flush lubrication of all bearings and gears is essential for long life of parts. The flushing action washes away small particles that might accumulate and cause abrasion and early failure. The gears dip in a bath of oil as they rotate. Oil is positively lifted from the case reservoir by special pockets in the low speed gears, and directed through the low speed and intermediate bearings in a continuous stream. The high speed bearings are lubricated by oil from the high speed pinion at the outer end of each bearing, so oil can flow through the bearings freely. Mechanical oil seals are not used. Specially designed labyrinth grooving prevents the lubricant from leaving the gear case along the shafts, and keeps out the dust and weather. Since there is nothing to wear, these seals are permanent.

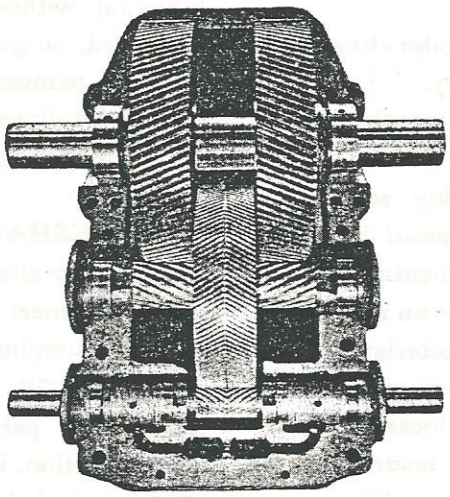
WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

GEAR SPECIFICATIONS

LOW SPEED GEAR SET

The design of the low speed gear set is a special feature of the PACIFIC-WESTERN Gear Unit. Made of alloy steel, the gears are heat treated for maximum strength and hardness and rated in accordance with the recommended practices for rating Herringbone Gears, as adopted by A.P.I. Instead of being a solid Herringbone Gear, located in the center of the shaft, the low speed gear is split, each half being mounted close to the main supporting bearings. Though the face of the Herringbone Gear is separated, it is obvious that the effect is just the same as a solid Herringbone Gear.



Pacific-Western Herringbone Gears

HIGH SPEED GEAR SET

The high speed gear is pressed onto the intermediate. shaft, and located between the two halves of the low speed gear set. Thus, the torque is transmitted from the high speed gear to the low speed pinion shaft at its strongest point, and only half the total torque is transmitted to each side of the low speed pinion, resulting in lower shaft loading. Note the location of the pinion bearings close to the load. Like the low speed gears, these gears are of alloy steel, heat treated and rated in accordance with A.P.I. practices. The Sykes type Herringbone generated gear is used for the high speed gears. The low speed gears are precision hobbed.

PACIFIC-WESTERN DOUBLE REDUCTION GEARS NOMINAL HORSEPOWER RATINGS

Strokes per Minute	GEAR FRAME NUMBER								
	24LFO	30LFO	33LFO	37LFO	42LFO	48LFO	52LFO	60LFO	72LFO
5	0.81	1.42	2.0	3.0	4.55	6.9	8.9	13.2	20.8
6	0.97	1.70	2.46	3.6	5.45	8.3	10.7	15.8	25.0
7	1.13	1.98	2.85	4.2	6.4	9.8	12.5	18.4	29.0
8	1.29	2.26	3.25	4.9	7.3	11.2	14.3	21.0	33.2
9	1.46	2.55	3.65	5.5	8.2	12.5	16.0	23.7	37.4
10	1.62	2.83	4.05	6.1	9.1	13.9	17.8	26.3	41.5
11	1.78	3.11	4.45	6.7	10.0	15.4	19.6	29.0	45.6
12	1.94	3.40	4.85	7.3	10.9	16.8	21.4	31.6	49.8
13	2.10	3.68	5.25	7.9	11.8	18.1	23.2	34.2	54.0
14	2.26	3.96	5.65	8.5	12.7	19.5	24.9	36.8	58.0
15	2.43	4.25	6.05	9.1	13.7	21.0	26.7	39.5	62.2
16	2.59	4.53	6.5	9.7	14.6	22.4	28.5	42.1	66.4
17	2.75	4.81	6.9	10.6	15.5	23.7	30.3	44.8	70.5
18	2.91	5.10	7.3	10.9	16.4	25.2	32.1	47.4	74.6
19	3.07	5.38	7.7	11.5	17.3	26.6	33.8	50.0	78.9
20	3.24	5.66	8.1	12.15	18.2	28.0	35.6	53.0	83.0
21	3.40	5.94	8.5	12.75	19.1	29.3	37.4	55.2	87.2
22	3.56	6.23	8.9	13.35	20.0	30.8	39.2	58.0	91.3
23	3.72	6.51	9.3	14.0	20.9	32.2	41.0	60.5	95.5
24	3.88	6.79	9.7	14.6	21.8	33.6	42.7	63.1	99.6
25	4.04	7.08	10.1	15.2	22.8	34.9	44.5	65.8	104.0
26	....	....	....	....	....	36.4	46.3	68.5	108.0
27	....	....	....	....	....	37.8	48.1	71.0	112.0

Values based upon peak torque ratings established by API formula

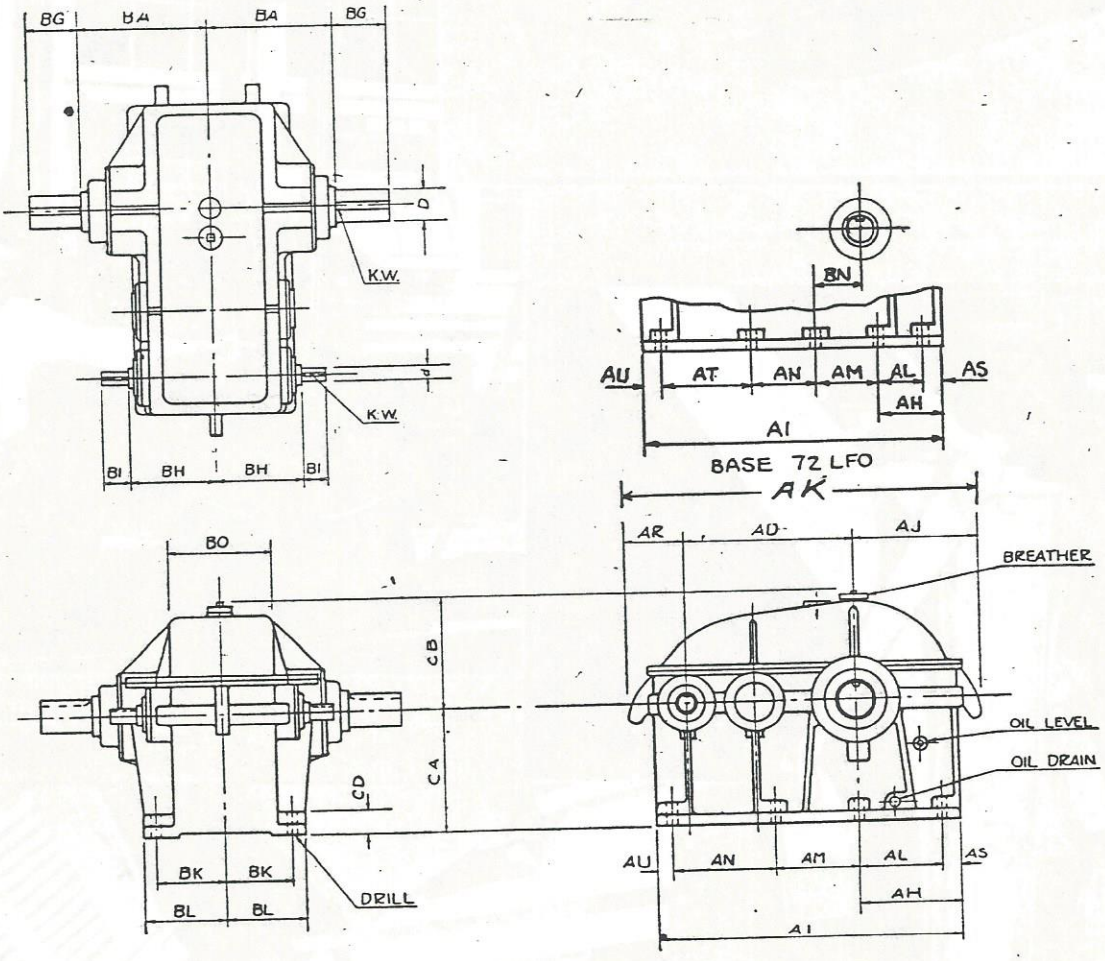
WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

PACIFIC-WESTERN

DOUBLE REDUCTION — TYPE LFO

HERRINGBONE REDUCERS



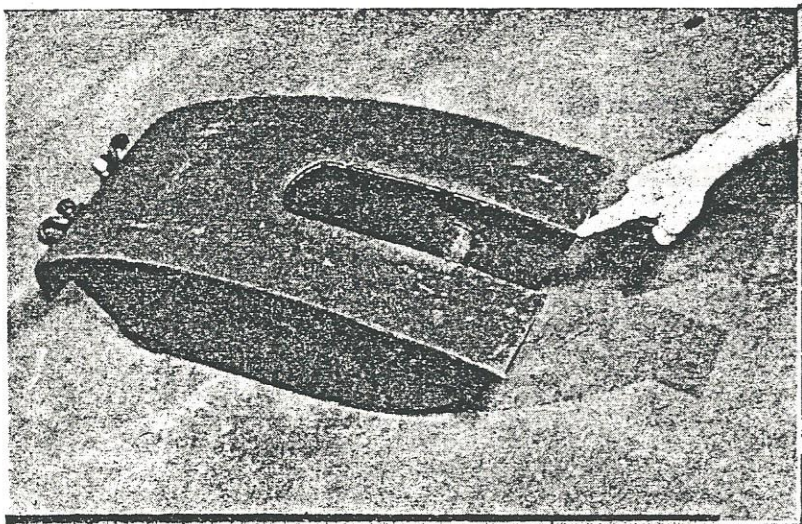
DIMENSIONS IN INCHES

For reference only, certified prints furnished for construction purposes.

SIZE	AD	AH	AI	AJ	AK	AL	AM	AN	AR	AS	AT	AU	BA	BG	BH	BI	BK	BL	BN	BO	CA	CB	CD	D	KW	d	kw	Drill
24LFO.....	12	7½	22	9⅜	25¾	6½	6½	7	4⅜	1		1	9½	4	6½	1¾	5	6	8	7⅞	12	9	1½	2¼	½	1⅛	¼	7/8
30LFO.....	15	9½	27¼	11⅜	31	7½	7½	9	4⅝	2		1¼	10½	5	7	2	5½	6½	8	8¾	12	10⅞	2	2¾	⅝	1¼	¼	1
33LFO.....	16½	9¾	29¼	12¼	34¼	8	8	10	5½	1¾		1½	12½	5	8	2½	6½	7¾	8	10	12	11⅛	2¼	3¼	¾	1½	⅜	1
37LFO.....	18½	11⅝	34¾	13½	38½	9½	9½	12	6½	2⅛		1⅝	14	5	9⅛	3	7¼	8½	8	12	12	13	2¼	3½	⅞	1¾	⅜	1
42LFO.....	21	15	41½	16	42¾	11	11	12	5¾	4		3½	17	6	11	4	9	10½	8	14¾	15	15½	2¼	4½	1	1⅞	½	1
48LFO.....	24	15½	40⅝	15¼	45¼	13½	13	10⅝	6	2		1½	19	8	12½	4¾	10	12	8	17¼	16½	14⅞	2¾	5½	1¼	2½	⅝	1
52LFO.....	26	16¾	50⅛	19	55⅞	14	12	18⅜	10	2¾		3	23	9	14	5	12⅝	14½	8	19¾	20	19⅛	4	5⅞	1½	2	⅝	1
60LFO.....	36¼	17½	64¼	23⅜	68¾	15½	22⅞	22⅜	9⅛	2		2	26	7	18¼	6	14¼	15½	8	24¼	23⅜	24⅜	3	5⅞	1½	3⅛	¼	1
72LFO.....	36	14¼	66	24¾	71	10	16	11	10¼	4¾	20½	4¼	28½	10	18½	7	16¼	18¼	8	27¼	25	25	4½	7	1½	3¼	¾	1

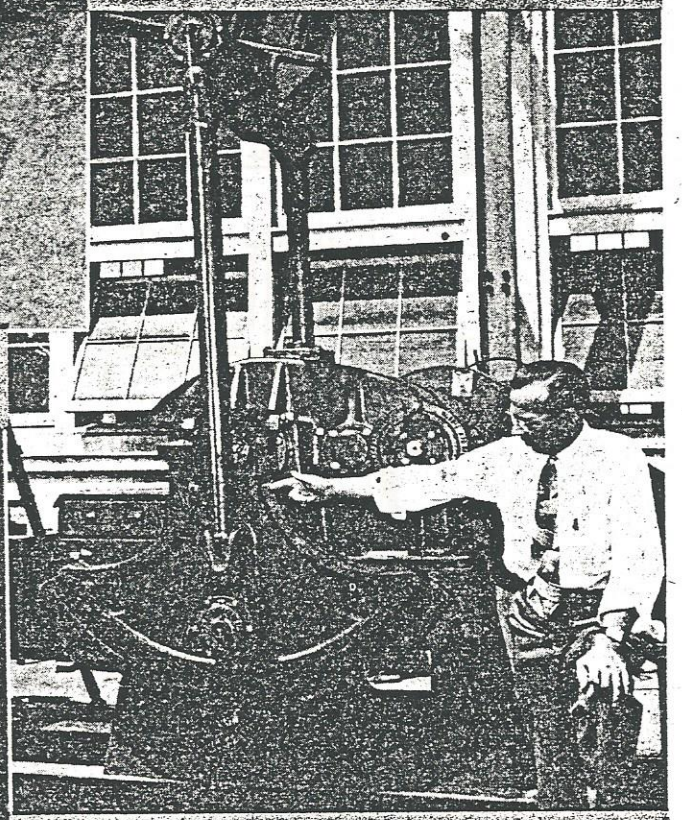
WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT



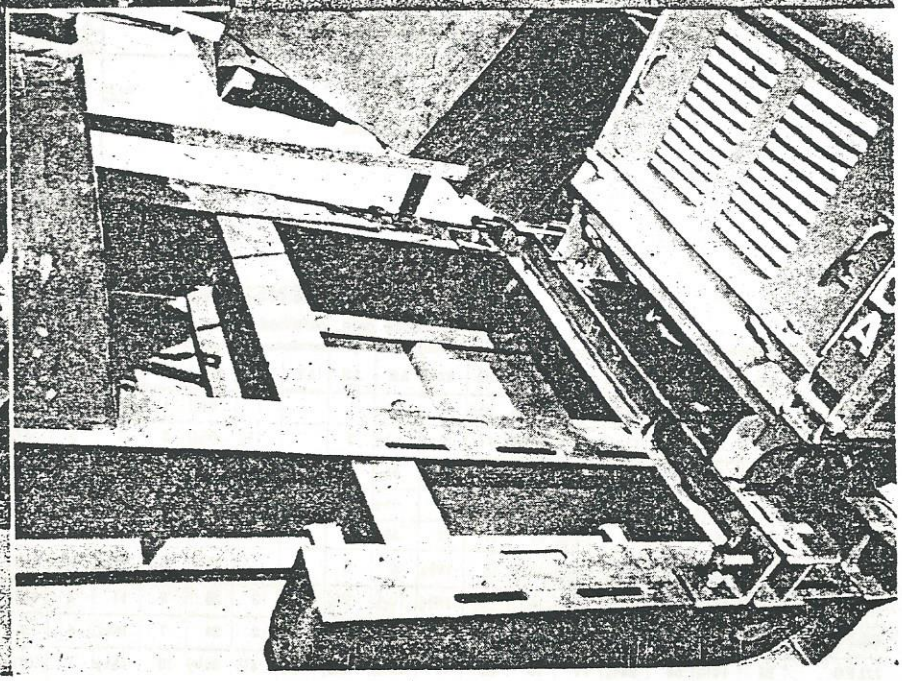
Left: The grooved horsehead used on Pacific Pumping Units permits ample polish rod clearance.

Below: Pipe type pitmans fitted with self-aligning, anti-friction bearings are standard on Pacific Pumping Units.



Below: Position of brake lever permits easy accessibility.

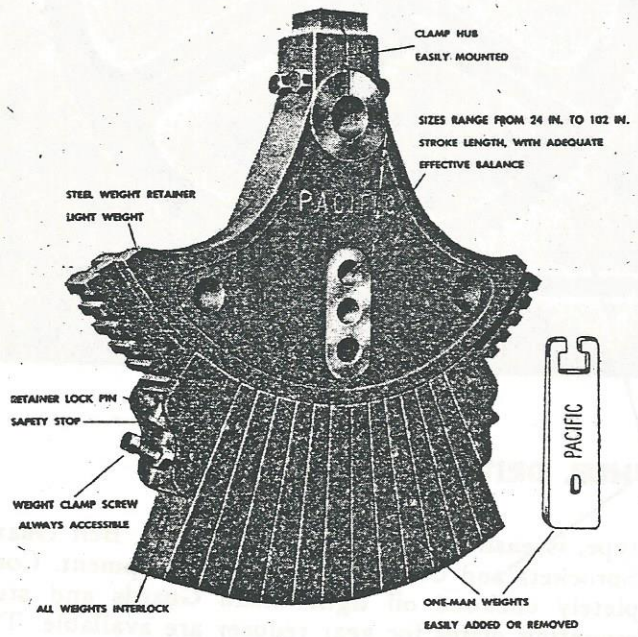
Below: Note the heavily ribbed construction of Pacific Pumping Unit frames.

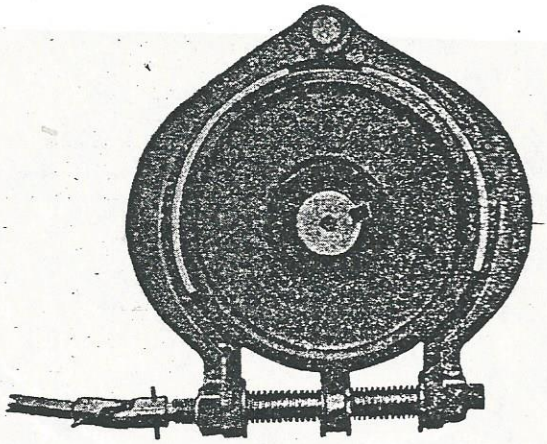


WESTERN GEAR WORKS LYNWOOD, CALIFORNIA
MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

THE PACIFIC SAFETY BRAKE

The PACIFIC Safety Brake is a conclusive answer to the problem of handling a pumping unit without danger of the brake slipping or releasing unexpectedly. Two cast shoes, each lined with high-friction brake lining, operate against a drum on the high speed shaft of the unit, actuated by a right and left hand screw from a remote control crank. A quarter turn sets the brake; it cannot release accidentally. The crank lever shaft has a universal joint coupling which permits the brake to be operated from any point within a wide arc.



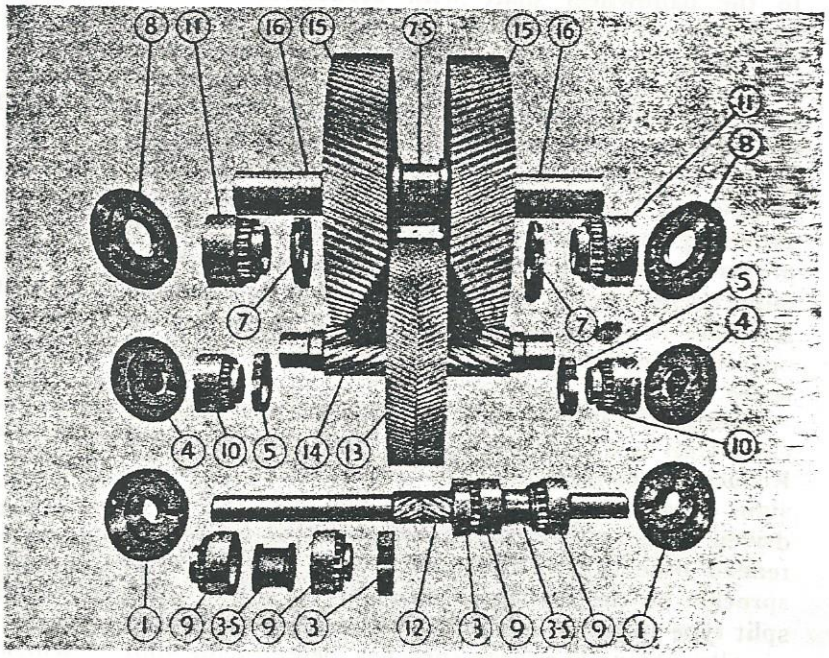


THE PACIFIC ECONOMY CRANK

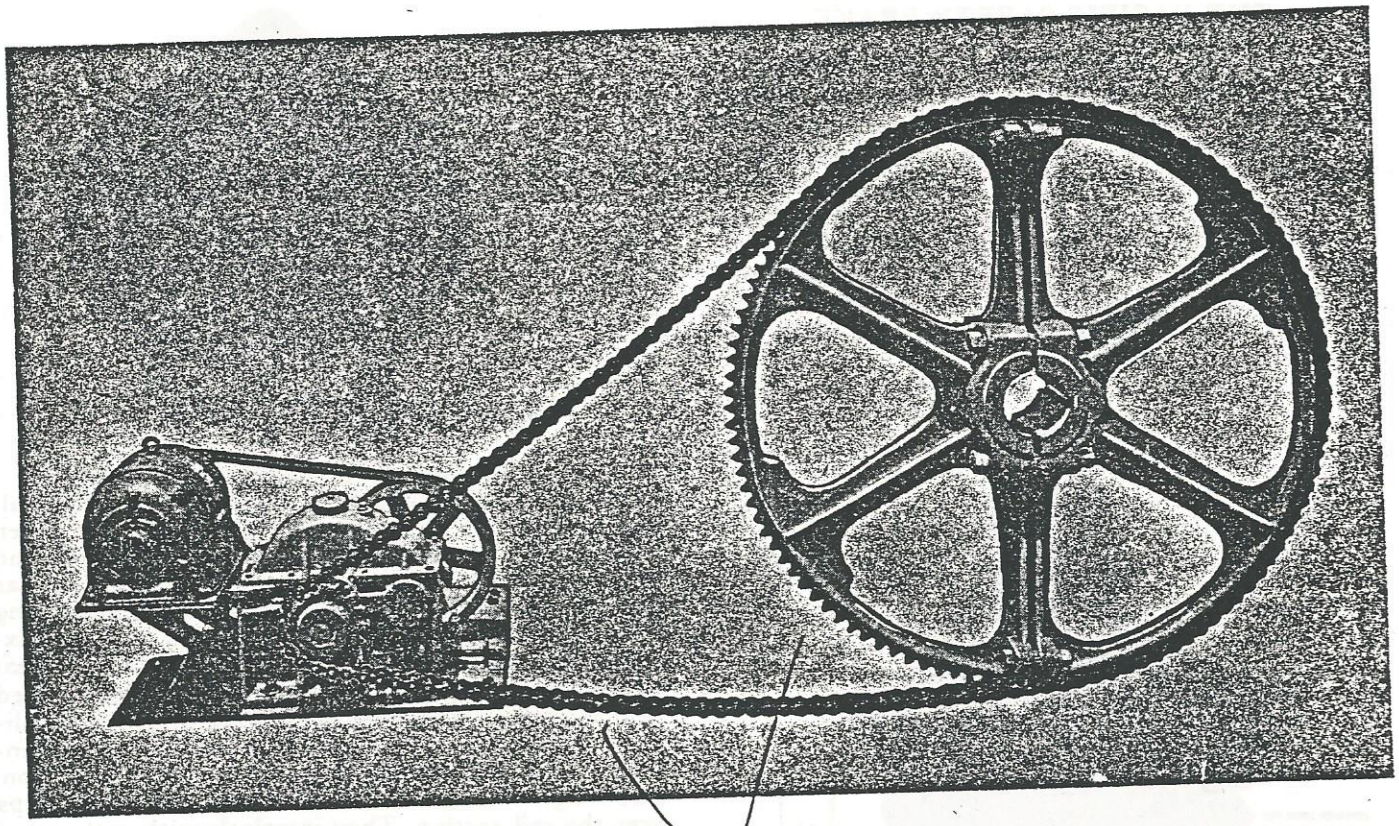
The PACIFIC Economy Crank Type Counterbalance is designed for maximum balancing effect when fully loaded, exceptional ease of adjustment and minimum counterbalance effect when empty. It has a relatively short radius so that the weights swing clear of the floor in all PACIFIC units with the exception of the large C-72LFO-30. It is economical because only the required number of weights need be purchased. The hub is of the clamp type to facilitate removal from the shaft. The crank body is fan-shaped and the outside periphery is a rail section. The weights are cast iron with a tee slot which slips over the rail section. They interlock with each other and are conveniently sized so that they can be handled by one man. The weights are backed up by cast retainers which also ride on the rail. Each retainer is locked in position by a large pin which extends into one of a number of conveniently spaced holes or slots (depending on the model) in the outside periphery of the rail of the crank. A simple spring device retains the pin. The weights are tightly clamped together by a large set screw in each end.

PARTS DESIGNATIONS

1—High Speed Gland.
3—High Speed Spacer.
3-S—High Speed Spacer Collar.
4—Intermediate Shaft Bearing Retainer.
5—Intermediate Shaft Spacer.
7—Low Speed Spacer Collar.
7-S—Low Speed Spacer Collar.
8—Low Speed Gland.
9—High Speed Bearing.
10—Intermediate Shaft Bearing.
11—Low Speed Bearing.
12—High Speed Pinion.
13—High Speed Gear.
14—Low Speed Pinion (Intermediate Shaft).
15—Low Speed Gear.
16—Low Speed Shaft.
17—Gear Case, Lower Section (Not Shown).
18—Gear Case, Upper Section (Not Shown).



WESTERN GEAR WORKS LYNWOOD, CALIFORNIA
MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT



PACIFIC BANDWHEEL DRIVES

GENERAL: PACIFIC Bandwheel Drives are built to reduce operating cost on wells equipped with standard ends. It modernizes the standard end by replacing the old style prime mover and drive up to the bandwheel shaft with economical modern equipment. This drive offers most of the desirable features of the portable pumping unit at a much lower cost. It has advantages over the conventional pumping unit in that the high walking beam and counterbalance capacity and the 54-56 inch stroke length of the standard end are retained. PACIFIC Bandwheel Drives are inherently slow speed units, providing speeds down to one stroke per minute. The proper well speed for maximum production and minimum horsepower is easily obtained. Marked savings are made in surface and sub-surface maintenance by operating in the last hole at the slowest practical speed.

DESCRIPTION: The PACIFIC Bandwheel Drive Gear Unit is a single reduction Herringbone Speed Reducer of conventional PACIFIC-WESTERN design, construction and quality. The unit is V-Belt driven from an Electric Motor mounted on an extended base cast integral with gear case. A steel sprocket on the low speed shaft drives a cut tooth, split type sprocket on the bandwheel shaft by means of roller chain. The large sprocket, being of the split type, is easily installed. Sheaves, Belts, Belt Guard, Sprockets and Chain are standard equipment. Completely enclosed oil tight Chain Guards and steel mounting plates for gear reducer are available. The Engine and Belt House can be cut off at the rear of the Bandwheel, and the equipment and material salvaged. The resulting rig presents a neat and compact appearance.

ECONOMICS OF PACIFIC BANDWHEEL DRIVE: The Bandwheel Drive is used to replace the conventional gas engine or electric motor standard end installation, and where used, is less expensive than the central power.

When applied in place of the standard end gas engine drive, repair costs on the belt, clutch and engine are eliminated, and lubricating oil costs become negligible.

When the large general purpose standard end electric motor is replaced, the power saving alone usually justifies the installation. As in the case of the gas engine, the belting costs are eliminated.

Where wells are equipped with standard ends, it is usually cheaper to install bandwheel drives than central power. Each well is then independently operated at optimum speed and stroke.

Individual hookups make it possible to operate each well in the last hole at the lowest speed at which full production can be obtained, eliminating

WESTERN GEAR WORKS LYNWOOD, CALIFORNIA
MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

PACIFIC-WESTERN TYPE BW BANDWHEEL DRIVES

SPEED—CAPACITY FRAME BW-14 & BW-19

Horse Power of Prime Mover	MINIMUM SPEEDS			
	BW-14		BW-19	
	RPM Output Shaft	Well Speed SPM	RPM Output Shaft	Well Speed SPM
1	9.9	1.4	5.1	0.73
1½	14.8	2.1	7.6	1.1
2	19.8	2.8	10.3	1.5
2½	24.8	3.5	12.7	1.8
3	29.7	4.2	15.2	2.2
3½	34.6	4.9	17.8	2.5
4	39.6	5.6	20.3	2.9
4½	44.5	6.3	22.9	3.3
5	49.5	7.1	25.4	3.6
6	59.4	8.5	30.5	4.4
7	69.3	9.9	35.5	5.1
8	79.2	11.3	40.6	5.8
9	89.0	12.7	45.7	6.5
10	98.9	14.1	50.7	7.2
11	....	..	55.8	8.0
12	....	..	60.8	8.7
13	....	..	65.9	9.4
14	....	..	71.0	10.1
15	....	..	76.1	10.9

NOTE: The above Output Shaft Speeds and Well Pumping Speeds are the minimum that may be reached safely with the Prime Mover Horse Power shown. Well speeds are based upon a Bandwheel Chain ratio of 7 to 1 using a 112 Tooth Bandwheel Sprocket and a 16 Tooth Sprocket on the Output Shaft of the Gear.

WELL SPEED V-BELTS FRAME BW-14 & BW-19

Pitch Diameter—Motor Sheave	WELL SPM AT MOTOR SPEEDS			
	950 RPM	1150 RPM	1450 RPM	1750 RPM
4.0	3.65	4.42	5.58	6.73
4.5	4.11	4.98	6.28	7.58
5.0	4.56	5.53	6.97	8.42
5.4	4.93	5.97	7.52	9.09
5.6	5.11	6.20	7.80	9.42
5.8	5.29	6.42	8.08	9.76
6.0	5.47	6.64	8.37	10.10
6.2	5.65	6.86	8.64	10.44
6.4	5.83	7.08	8.92	10.78
6.6	6.03	7.30	9.20	11.11
6.8	6.20	7.52	9.47	11.45
7.0	6.39	7.74	9.76	11.79
7.5	6.85	8.30	10.46	12.63
8.0	7.30	8.85	11.17	13.47
9.0	8.20	9.95	12.58	15.15
10.0	9.13	11.05	13.97	16.85
11.0	10.05	12.20	15.35	18.55
12.0	10.95	13.30	16.75	20.20

NOTE: BW-14 = "A" Section Belts.
BW-19 = "B" Section Belts.
Above speeds based on 16.5" P.D. Reducer Sheave.

WESTERN GEAR WORKS LYNWOOD, CALIFORNIA
MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

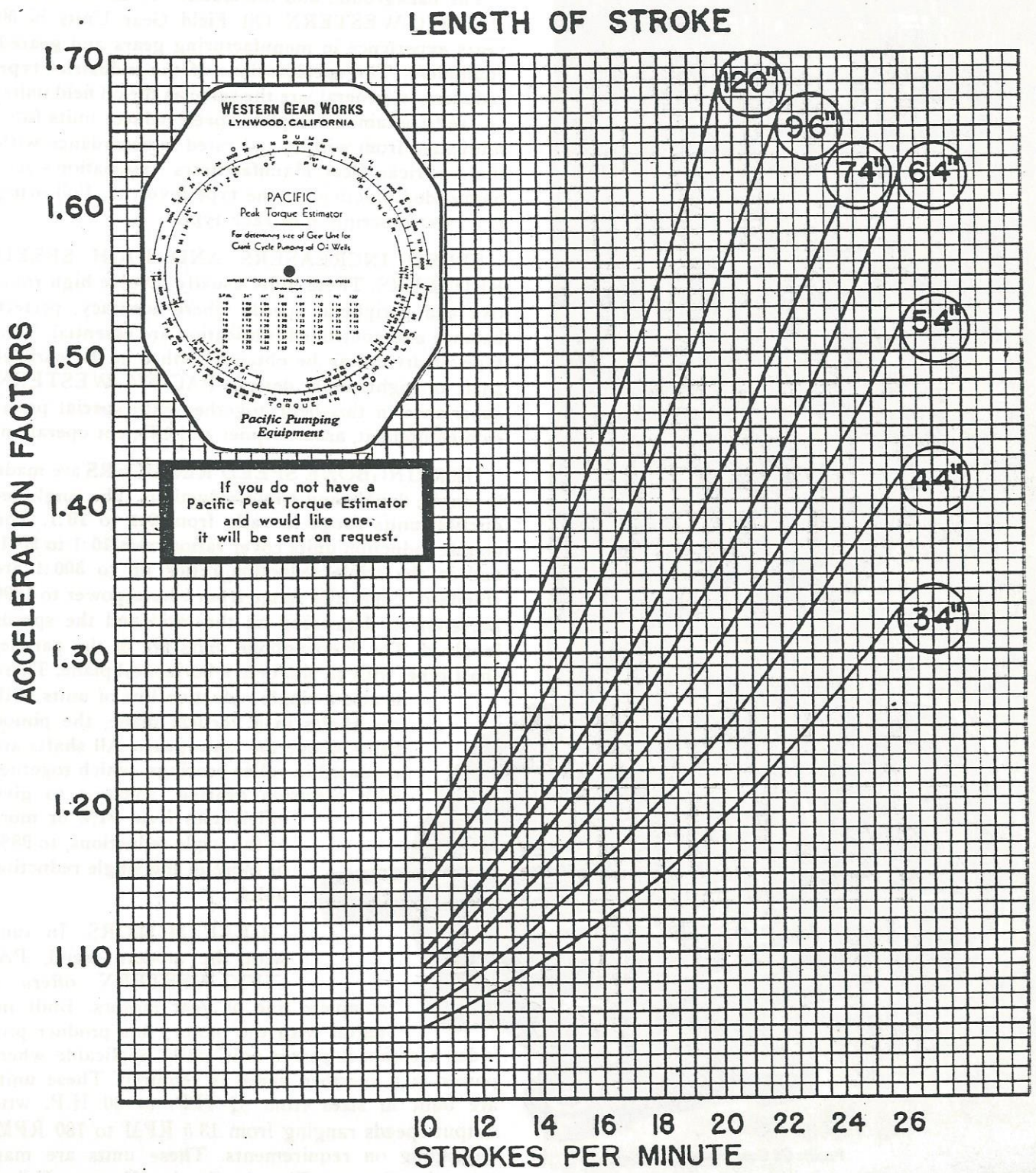
WELL LOADS PER 1000 FEET — SPECIFIC GRAVITY 1.00

Size of Pump Plunger	Size Rods	WEIGHT TO BE LIFTED—Pounds per 1000 Feet				
		Rods Only	Fluid		Half Fluid Plus Rods	All Fluid Plus Rods
			Half	All		
1"	5/8	1120	104	207	1224	1327
	3/4	1600	74	149	1674	1749
	7/8	2100	4	8	2114	2118
1 1/16"	5/8	1120	126	251	1246	1371
	3/4	1600	96	193	1696	1793
	7/8	2110	62	124	2172	2234
1 1/4"	5/8	1120	200	399	1320	1519
	3/4	1600	170	340	1770	1940
	7/8	2110	136	271	2246	2381
1 7/16"	5/8	1120	285	570	1405	1690
	3/4	1600	256	512	1856	2112
	7/8	2110	221	443	2331	2553
1 1/2"	5/8	1120	316	633	1436	1753
	3/4	1600	287	574	1887	2174
	7/8	2110	252	505	2362	2615
1 3/4"	5/8	1120	455	909	1575	2029
	3/4	1600	425	851	2025	2451
	7/8	2110	391	782	2501	2892
2"	5/8	1120	614	1228	1734	2348
	3/4	1600	585	1170	2185	2770
	7/8	2110	550	1101	2660	3211
2 1/4"	5/8	1120	795	1590	1915	2710
	3/4	1600	765	1531	2365	3131
	7/8	2110	731	1462	2841	3572
2 1/4"	1	2880	678	1355	3538	4235
2 1/2"	3/4	1600	968	1936	2568	3536
	7/8	2110	933	1867	3043	3977
	1	2880	876	1752	3756	4632
2 3/4"	3/4	1600	1191	2382	2791	3982
	7/8	2110	1156	2313	2266	4423
	1	2880	1095	2190	3975	5070
3 3/8"	3/4	1600	1842	3685	3442	5285
	7/8	2110	1808	3616	3918	5726
	1	2880	1732	3465	4612	6345
3 3/4"	3/4	1600	2297	4595	3897	6195
	7/8	2110	2263	4526	4373	6636
	1	2880	2180	4360	5060	7240
4 3/4"	3/4	1600	3670	7340	5270	8940
	7/8	2110	3635	7270	5745	9380
	1	2880	3600	7200	6480	10080
5 3/4"	3/4	1600	5420	10840	7020	12440
	7/8	2110	5385	10770	7495	12880
	1	2880	5350	10700	8230	13580

WEIGHT OF RODS: 5/8" — 112 lbs. per 100 ft.
3/4" — 160 lbs. per 100 ft.
7/8" — 211 lbs. per 100 ft.
1" — 288 lbs. per 100 ft.

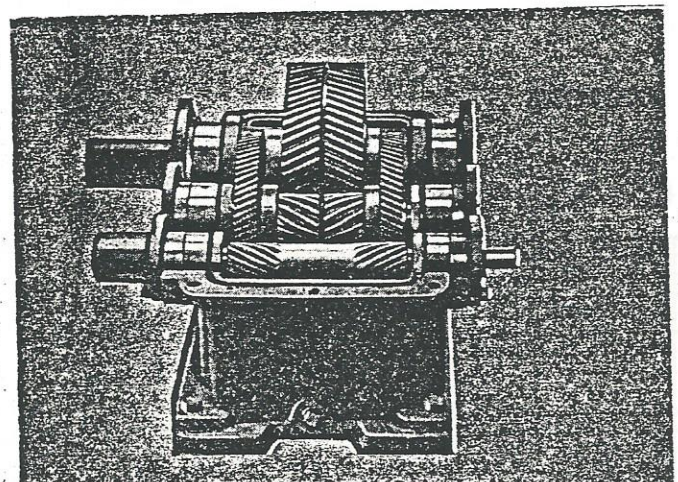
WESTERN GEAR WORKS LYNWOOD, CALIFORNIA
MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

ACCELERATION FACTORS

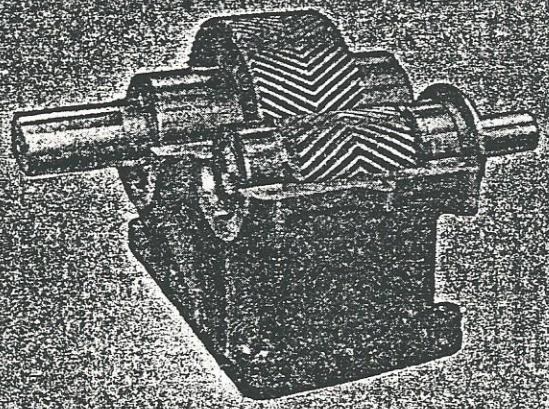


WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

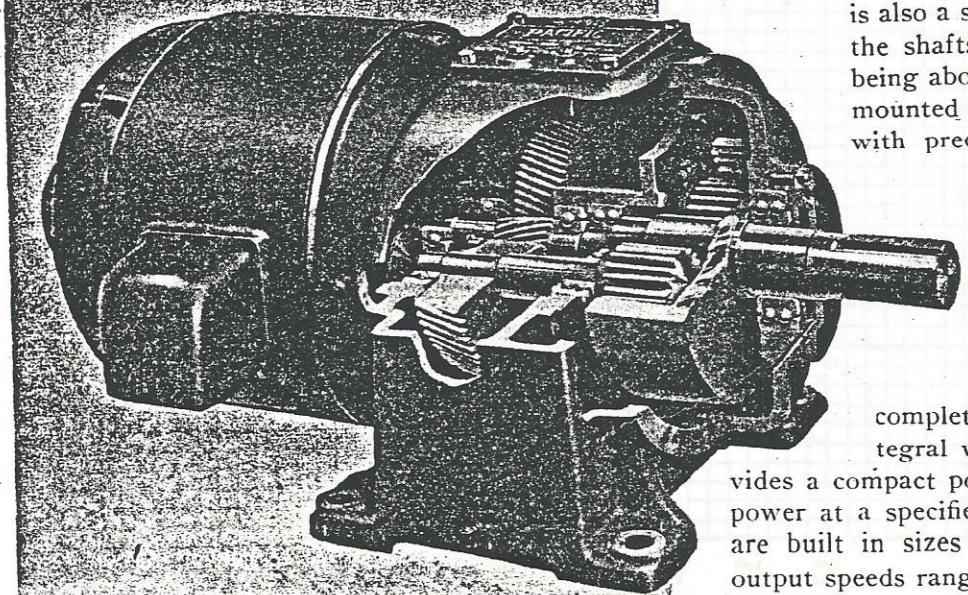
MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT



Herringbone Double Reduction Unit



Herringbone Single Reduction Unit



Pacific GE Gear Motor

OTHER GEAR PRODUCTS OF PACIFIC WESTERN

The background and foundation for the successful PACIFIC-WESTERN Oil Field Gear Units is 50 years experience in manufacturing gears and geared equipment. The specifications of the industrial type reducers, in general, are the same as the oil field units, i.e., self-contained complete speed reducer units fully lubricated from within, and rated in accordance with the American Gear Manufacturers Association's recommended practice for the type involved. Following is a brief description of each type.

SPEED INCREASERS AND HIGH SPEED REDUCERS. These units usually involve high rotative and peripheral speeds where accuracy, perfect balance and controlled lubrication are essential. This type of drive may be obtained either in the parallel shaft or right angle design. PACIFIC-WESTERN experience in this field, together with special precision equipment, assures quiet and efficient operation.

HERRINGBONE SPEED REDUCERS are made in single, double and triple reductions. The single reduction units range in ratio from 2:1 to 10:1. The double reduction units cover ratios from 10:1 to 90:1, and in the triple reduction ratios up to 300:1 are standard. Capacities range from 2 horsepower to 1500 horsepower, depending on the ratio and the speeds involved. The Herringbone units are of the parallel shaft type, with all shafts in a horizontal plane. There is also a single reduction line of units with the shafts in a vertical plane, the pinion being above the main gears. All shafts are mounted in roller bearings, which together with precision gearing, combine to give efficiencies from 94% or more in the triple reductions, to 98% or more in the single reduction units.

GEAR MOTORS. In tune with the modern trend, PACIFIC-WESTERN offers a complete line of gear motors. Built integral with the motor, this product provides a compact power unit easily applicable where power at a specified speed is required. These units are built in sizes from ¼ H.P. to 50 H.P. with output speeds ranging from 13.5 RPM to 780 RPM, depending on requirements. These units are marketed by General Electric Co. in Western United States.

WESTERN GEAR WORKS LYNWOOD, CALIFORNIA

MANUFACTURERS OF PACIFIC PUMPING EQUIPMENT

OTHER GEAR PRODUCTS OF PACIFIC WESTERN

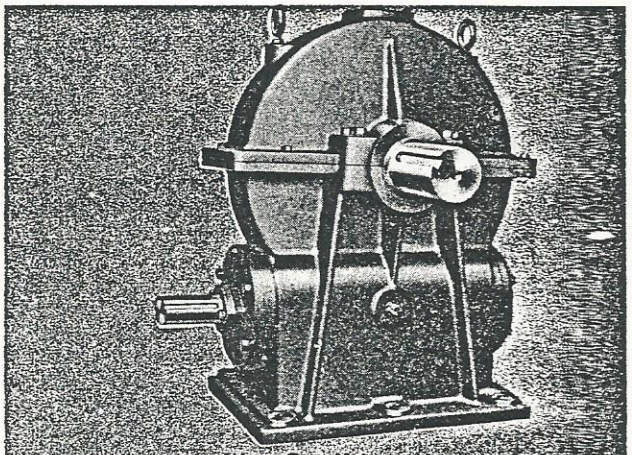
WORM GEAR SPEED REDUCERS are offered in a range of standard sizes. Ratios are obtainable from 7:1 to 100:1 in standard units, and in special units up to 1000:1 or more. Capacities range from ½ H.P. to 60 H.P., depending on speed and ratio specified. PACIFIC-WESTERN worm gear units are designed for rugged service. The worm gears are of high grade gear bronze, and the worms, which are cut integral with the shaft, are heat treated alloy steel. All high speed shafts are mounted in ball bearings, while the low speed bearings may be either bronze or roller, as required.

RIGHT ANGLE SPEED REDUCERS, in standard sizes for high efficiency requirements, are made in single, double and triple reductions. The single reduction units consist of a pair of spiral bevel gears mounted in a rigid cast iron case on roller bearings, and cover ratios from 1:1 to 7:1. For double reduction requirements, a set of helical gears is added for the low speed set, increasing the ratio change up to 55:1. For higher ratios a high speed set of herringbone or helical gears is mounted ahead of the spiral bevel gear set. All of these units are furnished both in the horizontal output and vertical output shaft types. Standard sizes are manufactured from 5 H.P. to 200 H.P. depending on the speed and ratio used. The mechanical efficiency is comparable with the Herringbone units, ranging from 97% or better in the single reduction units, and 94% or more in the triple reduction.

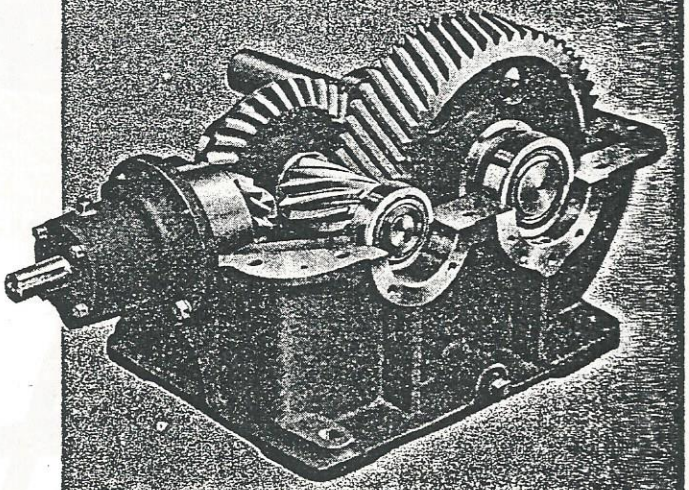
MOTOR BASES are made in standard sizes for all speed reducers. The base, designed for rigidity to maintain alignment, mounts both the motor and speed reducers, and provides an economical method of installing a speed reducer set as a single unit.

GENERAL GEARING: For manufacturers of equipment requiring gears, and for users of gearing, we are equipped to furnish information and supply gears of practically any type. We have equipment for manufacturing Spur, Helical, Herringbone, Bevel, Spiral Bevel, Hypoid and Worm gears, also Roller Chain Sprockets. Herringbone, Helical and Spur gears may be either hobbed or generated, whichever is best suited. Where continuous tooth Herringbone Gears are required, these may be had up to 60" diameter and face.

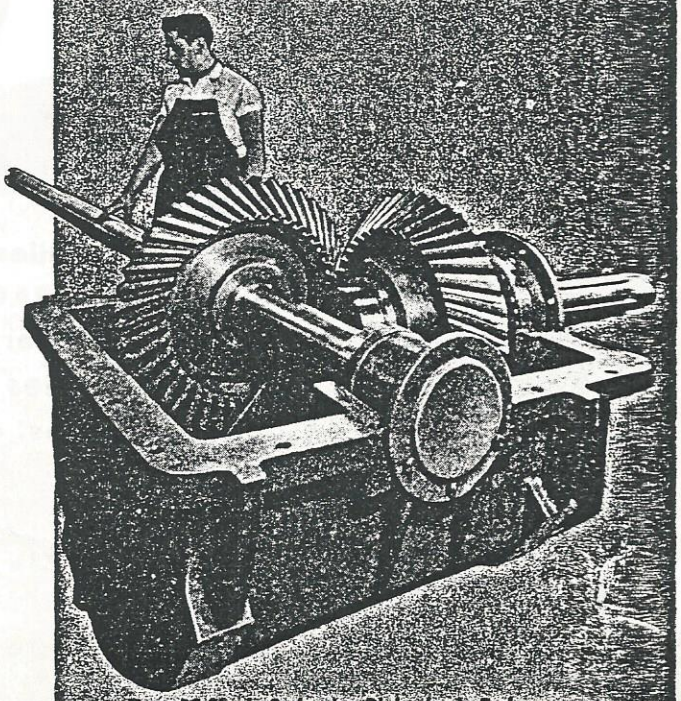
A highly specialized complete heat treating and laboratory department enables us to furnish gears to any strength specification.



Worm Gear Unit

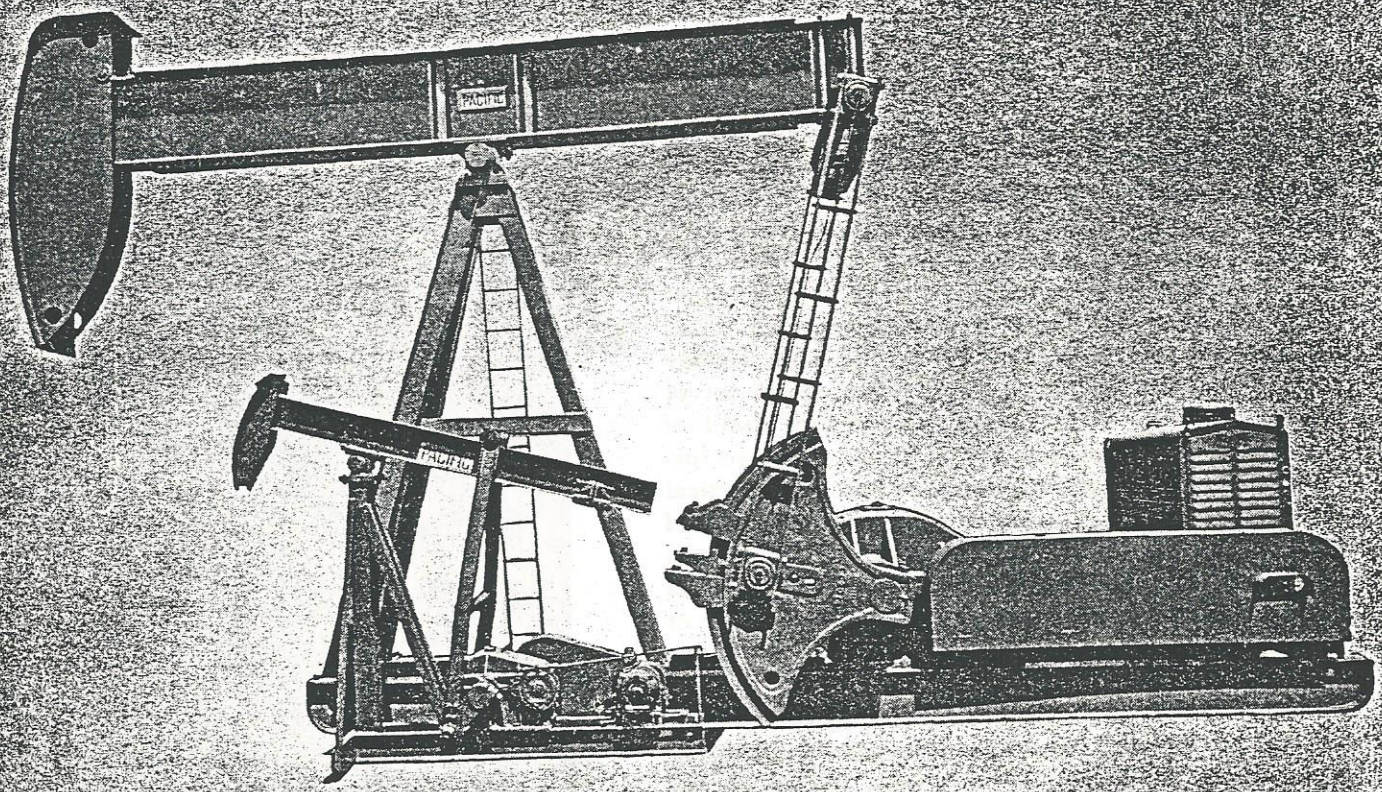


Type BH Double Reduction Right Angle Reducer



Type BS Single Reduction Right Angle Reducer

PACIFIC
PUMPING EQUIPMENT



Largest and Smallest Standard PACIFIC Steel Pumping Units. PACIFIC-WESTERN herring-bone gear reducers are available in peak torque capacities from 6,000 in. lbs. to 1,000,000 in. lbs. or more.

WESTERN GEAR WORKS

MANUFACTURERS OF PACIFIC-WESTERN GEAR PRODUCTS